

(*Bubulcus ibis*), particularly after the Sandhill Cranes departed the area in the spring (Folk 1992).

Wintering cranes are most abundant in Florida from November through March, which closely corresponds with the Florida Bald Eagle nesting season (November through May; Wood and Collopy 1993). Florida eagles feed young January through May. As opportunistic predators, these Bald Eagles have learned to capitalize on the large food source provided by debilitated Sandhill Cranes.

RESUMEN.—Colectamos los remanentes de la menos cuatro *Grus canadensis*, desde dos nidos de *Haliaeetus leucocephalus*, en Florida. Una pierna estaba marcada con un anillo seriado del Servicio de Pesca y Vida Silvestre de Los Estados Unidos. Esta ave fue identificada como un *G. c. tabida* de seis años, marcado en 1986 en los hábitat invernales de Florida. Los dos nidos de *H. leucocephalus* cerca de áreas frecuentadas por grandes bandadas de *G. canadensis* invernantes. Sospechamos que los individuos de *G. canadensis* capturados estaban debilitados por mycotoxicosis, una enfermedad que afecta entre 30 a 50 de los 200 a 300 *G. canadensis* que invernan cerca de uno de los nidos de *H. leucocephalus*.

[Traducción de Ivan Lazo]

ACKNOWLEDGMENTS

We thank R.E. Gill, Jr., R.J. Johnson, C.M. Sekerak, M.G. Spalding, and D.W. Stahlecker for their helpful comments on this manuscript. This is contribution number R03159 of the journal series of the University of Florida Agricultural Experiment Station.

LITERATURE CITED

- BRILL, N. 1987. Bald Eagle strikes Sandhill Crane. *Nebr Bird Rev.* 55:44.
- FOLK, M. 1992. Cooperative hunting in Bald Eagles. *Fla. Field Nat.* 20:110-112.
- GERRARD, J.M. AND G.R. BORTOLOTTI. 1988. The Bald Eagle: haunts and habits of a wilderness monarch. Smithsonian Inst. Press, Washington, DC U.S.A.
- JOHNS, B.W. 1977. Golden Eagle attempts to kill Sandhill Crane. *Blue Jay* 35:92-93.
- NESBITT, S.A., C.T. MOORE AND K.S. WILLIAMS. 1992. Gender prediction from body measurements of two subspecies of Sandhill Cranes. *Proc. North Am. Crane Workshop* 6:39-43.
- STALMASTER, M.V. 1987. The bald eagle. Universe Books, New York, NY U.S.A.
- . 1988. Bald eagle. Pages 232-237 in R.S. Palmer (ED.), *Handbook of North American birds*, Vol. 4. Yale Univ. Press, New Haven, CT U.S.A.
- WINDINGSTAD, R.M., H.E. STILES AND R.C. DREWEN. 1981. Whooping Crane preyed upon by Golden Eagle. *Auk* 98:393-394.
- , R.J. COLE, P.E. NELSON, T.J. ROFFE, R.R. GEORGE AND J.W. DORNER. 1989. *Fusarium* mycotoxins from peanuts suspected as a cause of Sandhill Crane mortality. *J. Wildl. Dis.* 25:38-46.
- WOOD, P.B. AND M.W. COLLOPY. 1993. Effects of egg removal on Bald Eagle productivity in northern Florida. *J. Wildl. Manage.* 57:1-9.

Received 22 December 1992; accepted 4 May 1993

*J. Raptor Res.* 27(3):165-166

© 1993 The Raptor Research Foundation, Inc.

FEMALE PARTICIPATION IN COURTSHIP DISPLAYS OF WESTERN MARSH HARRIERS  
(*CIRCUS AERUGINOSUS*) IN CENTRAL SPAIN

GUILLERMO BLANCO, MARIO A. HERRERA, JUAN A. FARGALLO AND JESÚS A. CUEVAS  
*Departamento de Biología Animal, Universidad de Alcalá de Henares,  
Alcalá de Henares, 28871 Madrid, Spain*

As part of territorial advertisement, courtship behavior or both, harriers (*Circus* spp.) perform complex aerial displays on their breeding grounds. The intensity and form of aerial displays vary among the species and between sexes of the same species. Since aerial displays of harriers are presumed to be stable species specific characters which function in mate recognition (Clouet 1978, Cramp and Simmons 1980, Simmons 1988, 1991), they have been useful in assessing the taxonomy of the marsh harrier complex (Simmons 1991).

The aerial dances performed by male Western Marsh Harriers (*C. aeruginosus*) have been described as including a basic undulating display in the horizontal plane, also seen in other species (so-called "sky-dancing"), and several other aerobatics such as plunges, somersaults and rolls (for details see Glutz et al. 1971, Cramp and Simmons 1980). However, these elaborate aerial maneuvers are unrecorded in female *C. aeruginosus*. Here we describe the prebreeding aerial evolutions of male and female Western Marsh Harriers in central Spain.

## STUDY AREA AND METHODS

Behavioral observations of Western Marsh Harriers were made during 1990–1993 at the Almoguera Reservoir (40°17'N 2°56'W; Tajo River; central Spain), where 12 pairs bred in medium-sized *Phragmites* and *Typha* marshes bordering the reservoir margins. Almost half of the adult population overwintered in the area, and had during winter a female-biased sex-ratio (10:4 individuals in December 1992). Observations were carried out from vantage hills located between the maximum heights reached by soaring harriers and their nesting grounds. We monitored the activity of harriers ( $N = 170$ ) in 86 hr of continuous focal observation throughout daylight period, and recorded 65 display sequences for birds of known sex.

## OBSERVATIONS AND DISCUSSION

Western Marsh Harriers displayed repeatedly (1.49 displays/hr) prior to laying (mean laying dates were mid-April; see González 1991), less frequently during hatching and fledging periods (0.75 displays per hour), and rarely in autumn-winter (1 display/30 hr). Females performed 58.46% of the recorded display sequences. Most displays took place during morning (75.38% before 1400 H). Aerial displays often were performed after lengthy sequences of high soaring and straight speed-gaining flights. Both male and female *C. aeruginosus* performed the horizontal sky-dancing display with all its variations, as described for males by Cramp and Simmons (1980). Furthermore, both sexes were observed displaying in a vertically oriented form with fast spiralling undulations seldom completed in a full loop calling at each peak. This behavior is very similar to the so-called "sky-spiralling" display described for the African Marsh Harrier (*Circus ranivorus*; Simmons 1991) and for the Swamp Harrier (*Circus approximans*; Baker-Gabb 1981) but so far has not been recorded as a stage in the display sequence of the Western Marsh Harrier. The general scheme of the aerial displays performed by Western Marsh Harriers in the study area closely coincided with that presented by Simmons (1991; Fig. 3) for *C. ranivorus*. However, as in this species, the sky-dancing display and the vertical drop sometimes proceeded separately after positioning and speed-increasing flights. The descent normally finished on the nest, swooping near another harrier or soaring close to the ground before the process was repeated.

Previous descriptions of the aerial displays of *C. aeruginosus* are based on observations from north and central Europe, where Marsh Harriers are migratory. In these zones, males return to their breeding sites earlier than females to establish territories and females do not display (Glutz et al. 1971, Cramp and Simmons 1980, Witkowski 1989). In our study area, female Marsh Harriers are sedentary with some movements (González 1991, pers. obs.), and frequently display like the males. Advertisement of territory occupancy by means of aerial displays can thus be carried out by both sexes as in other marsh harrier species (Baker-Gabb 1981, Simmons 1991). The mate attraction component of the aerial display is possibly more important for unmated birds, since polygyny is very rare

in Spanish *C. aeruginosus* (Fernández 1990, González 1991). The observations presented here give evidence that the structure of aerial displays and the sex of displayers show geographical variations in the Western Marsh Harrier

**RESUMEN.**—Tanto los machos como las hembras de Aguilucho lagunero *Circus aeruginosus* observados en una zona de cría del Centro de España, realizaron acrobacias aéreas antes y durante la época de reproducción. Las maniobras aéreas incluyeron un movimiento ondulante en el plano horizontal (sky-dancing), descrito anteriormente solo para los machos de la especie, y una caída vertical con ondulaciones laterales y gritos que no se había citado en esta especie aunque si en otras del género *Circus* que habitan también medios palustres.

## ACKNOWLEDGMENTS

We thank Mari C. Blanco, Santiago Merino, Fernando Gómez and Juan Prieto for assistance in the field and Jaime Potti, Keith L. Bildstein, William C. Scharf, Robert Simmons and Carl D. Marti for improving the language and commenting on the manuscript.

## LITERATURE CITED

- BAKER-GABB, D.J. 1981. Breeding behaviour and ecology of the Australasian Harrier (*Circus approximans*) in the Manawatu-Rangitikei Sand country. New Zealand. *Notornis* 28:103–119.
- CLOUET, M. 1978. Le busard de Maillard (*Circus aeruginosus maillardi*) de L'île de la Reunion. *Oiseau Rev Fr. Ornithol.* 48:95–106.
- CRAMP, S. AND K.E.L. SIMMONS (EDS.). 1980. Birds of the western Palearctic. Vol. II. Oxford Univ. Press, Oxford, U.K.
- FERNÁNDEZ, C. 1990. Censo, fenología y éxito reproductor del Aguilucho lagunero (*Circus aeruginosus* L.) en Navarra. *Munibe* 41:89–93.
- GLUTZ VON BLOTZHEIM, U.N., K.M. BAUER AND E. BEZZEL. 1971. Handbuch der Vogel Mitteleuropas. Vol. 4. Akademische Verlagsgesellschaft, Frankfurt am Main, Germany.
- GONZÁLEZ, J.L. 1991. El Aguillucho lagunero *Circus aeruginosus* (L., 1748) en España. Situación, biología de la reproducción, alimentación y conservación. Colecc. Téc., ICONA, Madrid, Spain.
- SIMMONS, R. 1988. Honest advertising, sexual selection, courtship displays, and body condition of polygynous male harriers. *Auk* 105:303–307.
- . 1991. Comparisons and functions of sky-dancing displays of *Circus* harriers: untangling the marsh harrier complex. *Ostrich* 62:45–51.
- WITKOWSKI, J. 1989. Breeding biology and ecology of the Marsh Harrier *Circus aeruginosus* in the Barycz valley, Poland. *Acta Ornithol.* 25:223–320.

Received 3 February 1993; accepted 12 May 1993